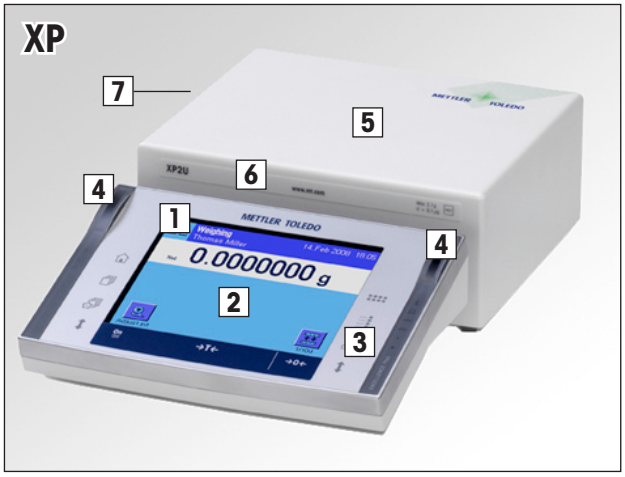
Operating Instructions

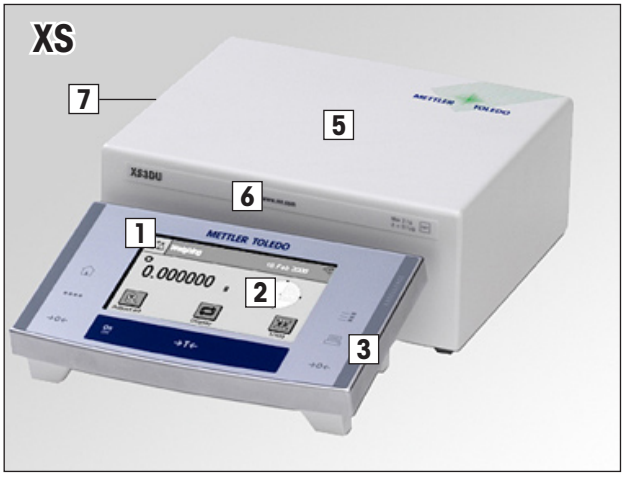
Excellence Micro- Ultra-Micro Balances

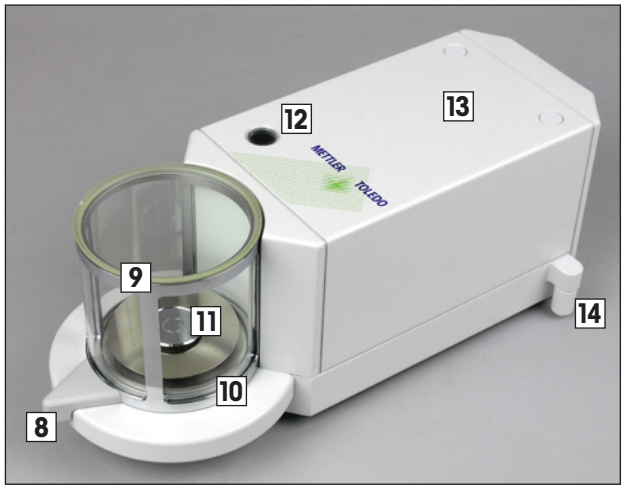
XP / XS Models – Part 1

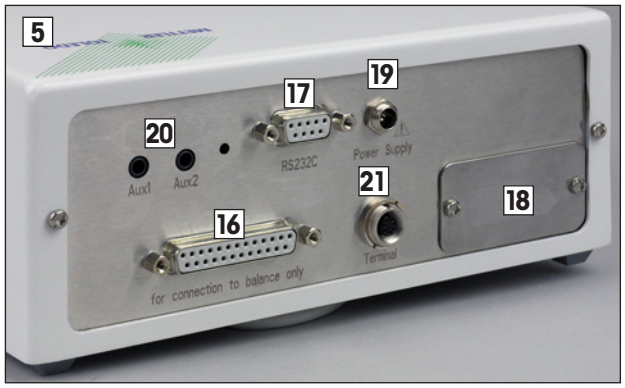
METTLER TOLEDO

Overview of XP/XS micro and ultra-micro balances









1 Terminal (XS models:Type "S", monochrome/XP models:Type "P", color), (for details see Operating Instructions – Part 2)
2 Display (Touch-sensitive "Touch Screen")
3 Operating keys
4 SmartSens sensors (terminal type "P" only)
5 Control unit
6 Type name
7 Drawer with weighing tweezers, cleaning brush, and cleaning tweezers
8 Door handle
9 Glass draft shield
10 Weighing chamber plate
11 Weighing pan
12 Level indicator
13 Weighing cell
14 Leveling screw
15 Socket for control unit
16 Socket for weighing cell
17 RS232C serial interface
18 Slot for second interface (optional)
19 Socket for AC adapter
20 Aux sockets for hand- or foot-switch (XS models) or "ErgoSens" (XP models)
21 Socket for terminal

Contents

1 Getting to know your balance 4
1.1 Introduction 4
1.1.1 Operating Instructions Part 1, this document 4
1.1.2 Operating Instructions Part 2, separate document 4
1.1.3 Operating Instructions Part 3, separate document 4
1.2 Introducing the XP/XS micro and ultra-micro balances 5
1.3 What you should know about these instructions 5
1.4 Safety has priority 6

2 Setting up the balance 7
2.1 Unpacking and checking the delivered items 7
2.1.1 Unpacking the balance 7
2.1.2 Checking the delivered items 8
2.2 Selecting a location 8
2.3 Assembling the balance 9
2.4 Power supply 9
2.5 Operating of the glass draft shield 10
2.6 Setting the reading angle and location of the terminal 10
2.6.1 Setting the reading angle 10
2.6.2 Remove terminal and place close to the balance 11
2.7 Transporting the balance 11
2.7.1 Transporting over short distances 11
2.7.2 Transporting over long distances 12
2.8 Below-the-balance weighing 12

3 Leveling the balance 13
3.1 Switching the balance on and off 13
3.2 Leveling the balance 13
3.2.1 Leveling aid of the XP models 13

4 Cleaning and service 15

5 Technical data 16
5.1 General data 16
5.1.1 Explanatory notes for the METTLER TOLEDO AC adapter 17
5.2 Model-specific data 18
5.2.1 Procedure for certified balances 19
5.3 Dimensions 21
5.3.1 Dimensions of the terminal and control unit of XP models 21
5.3.2 Dimensions of the terminal and control unit of XS models 22
5.3.3 Dimensions of the weighing cell (XS and XP models) 23
5.4 Specifications of the RS232C interface 24
5.5 Specifications of the "Aux" connections 24
5.6 MT-SICS Interface commands and functions 25

6 Accessories and spare parts 27
6.1 Accessories 27
6.2 Spare parts 31

7 Index 34

1 Getting to know your balance

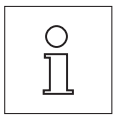
In this section you will be given basic information about your balance. Please read right through this section carefully even if you already have experience with METTLER TOLEDO balances; **please pay special attention to the safety warnings!**

1.1 Introduction

Thank you for choosing a METTLER TOLEDO balance.

The balances of the XP/XS line combine a large number of weighing and adjustment possibilities with exceptionally convenient operation.

The different models have different characteristics regarding equipment and performance. Special notes in the text indicate where this makes a difference to operation.



The Operating Instructions for the XP/XS balances consist of 3 separate documents, whose contents are listed in the following subsections.

1.1.1 Operating Instructions Part 1, this document

Contents: XP/XS micro and ultramicro balances

- Introduction
- Safety notes
- Setting up the balance
- Leveling the balance
- Cleaning and service
- Technical data
- Interface commands and MT-SICS functions
- Accessories
- Spare parts

1.1.2 Operating Instructions Part 2, separate document

Content: Terminal, system and applications

- Basic principles for using the terminal and the firmware
- System settings
- User-specific settings
- Applications
- Firmware (Software) updates
- Error and status messages
- Conversion table for weight units
- SOP - Standard Operating Procedure
- Recommended printer settings

1.1.3 Operating Instructions Part 3, separate document

Content: Adjustments and tests

- Adjustments
- Tests

1.2 Introducing the XP/XS micro and ultra-micro balances

The XP/XS family of micro and ultra-micro balances comprises a range of balances which differ from each other in relation to their weighing range and resolution.

The following features are common to all models of the XP/XS micro and ultra-micro balances:

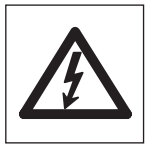
- Glass draft shield for precise weighing even in unstable environments (XP models with motorized drive.
- Fully automatic adjustment using internal weights ("ProFACT" on XP models, "FACT" on XS models).
- Built-in level sensor, illuminated level indicator and Leveling Assistant for fast and easy leveling (XP models only).
- Built-in applications for normal weighing, statistics, formulation, piece counting, percent weighing, density, differential weighing ((XP models only) and LabX Client.
- Integral RS232C interface.
- Slot for second interface (optional).
- Touch-sensitive graphics terminal ("Touch Screen") with color (XP models) or monochrome display (XS models).
- Two programmable sensors for hands-off operation ("SmartSens") to speed up frequently recurring tasks (XP models).

A brief word about standards, guidelines, and methods of quality assurance: The XP/XS balances comply with usual standards and guidelines. They support standard procedures, specifications, working methods, and reports according to **GLP** (**G**ood **L**aboratory **P**ractice), and allow the creation of **SOPs** (**S**tandard **O**perating **P**rocedure). In this connection, records of working procedures and adjustments become very important; for this purpose we recommend you to use a printer from the METTLER TOLEDO range, since these are optimally adapted to your balance. The XP/XS balances conform to the applicable standards and guidelines and possess a CE declaration of conformity. METTLER TOLEDO is certified as manufacturer according to ISO 9001 and ISO 14001.

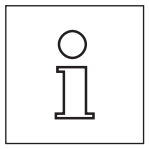
1.3 What you should know about these instructions

The following conventions apply to the operating instructions: Part 1, Part 2 and Part 3:

- Key designations are indicated by double angular parentheses (e.g. «**On/Off**» or «⋮≡» XP models, «≡» XS models).



These symbols indicate safety notes and hazard warnings which, if ignored, can cause personal danger to the user, damage to the balance or other equipment, or malfunctioning of the balance.



This symbol indicates additional information and notes. These make working with your balance easier, as well as ensuring that you use it correctly and economically.

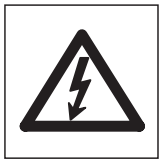
1.4 Safety has priority

Always operate and use your balance only in accordance with the Operating Instructions Part 1, Part 2 and Part 3.

The instructions for setting up your new balance must be strictly observed.

If the instrument is not used according to the manufacturer's Operating Instructions (Part 1, Part 2 and Part 3), protection of the instrument may be impaired.

It is not permitted to use the balance in hazardous environments.



Use only the AC adapter delivered with your balance, and check that the voltage printed on it is the same as your local power supply voltage. Only plug the adapter into a socket which is grounded.

Do not use sharply pointed objects to operate the keyboard of your balance!

Although your balance is very ruggedly constructed, it is nevertheless a precision instrument. Treat it with corresponding care.

Do not open the balance: It does not contain any parts which can be maintained, repaired, or replaced by the user. If you ever have problems with your balance, contact your METTLER TOLEDO dealer.

Use only balance accessories and peripheral devices from METTLER TOLEDO; they are optimally adapted to your balance.

Disposal

In conformance with the European Directive 2002/96/CE on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste.

This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

2 Setting up the balance

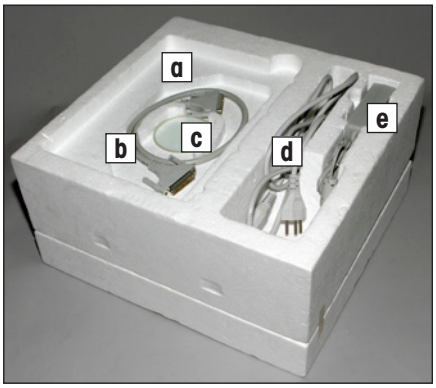
This section explains how to unpack your new balance, and how to set it up and prepare it for operation. When you have carried out the steps described in this section, your balance is ready for operation.

2.1 Unpacking and checking the delivered items

2.1.1 Unpacking the balance

Open the outer packaging box. Grasp the strap on the inner box and pull this out of the outer box along with the padding.

Remove the padding, take the inner box out of the plastic bag and place it on a level surface with the opening flap facing up. Open the inner box (open the flap and remove the cardboard sleeve).



Remove the following parts from the upper part of the packaging:

a Documents (already removed here)

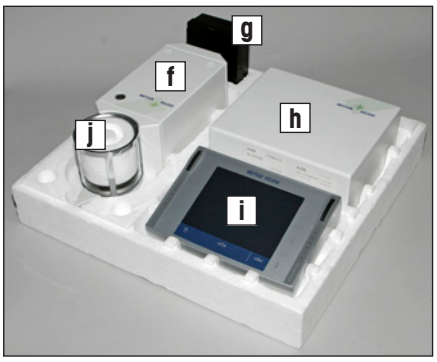
b Connecting cable for weighing cell – control unit

c Glass cover of the draft shield

d Mains cable (country-specific) for the AC adapter

e AC adapter

Lift off the upper part of the inner packaging.



You will find the following parts in the lower part:

f Weighing cell with draft shield

g Plastic box, contains the parts for the draft disk

h Control unit with mounted terminal (i) and protective cover for the terminal

Remove the parts from the packaging and remove the shipping lock (j) (plastic protection) from the draft shield.

Please keep all parts of the packaging.This packaging guarantees best possible protection of your balance for transportation (section 2.7).

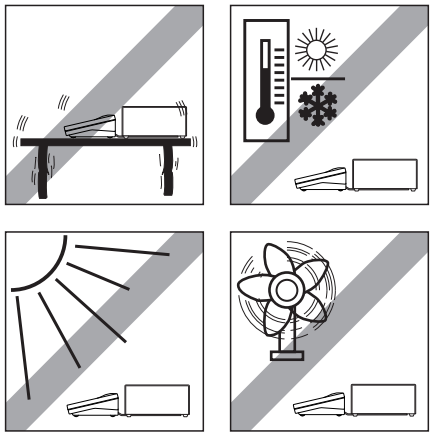
2.1.2 Checking the delivered items

The standard scope of delivery contains the following items:

- Weighing cell and control unit with terminal installed, Protective cover for the terminal
- Weighing pan is installed, draft disk and hook weighing pan (XP6U) are delivered separately and must be installed by the user
- AC adapter with country-specific power cable
- Connection cable for connecting the weighing cell to the control unit
- RS232C interface
- Slot for second interface (optional)
- Feedthroughs for below-the-balance weighing and for antitheft device
- Cleaning brush
- Cleaning tweezers
- Weighing tweezers
- Production certificate
- CE declaration of conformity
- Operating Instructions Part 1 (this document), Part 2 and Part 3

CarePac®S, for models XP2U and XP6 (Set for routine tests by using 2 test weights)

2.2 Selecting a location



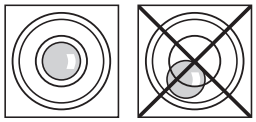
Choose a position which is stable, free from vibration, and as nearly horizontal as possible.The supporting surface must be able to bear the weight of the fully loaded balance safely.

Pay attention to the environmental conditions (section 5.1).

Avoid:

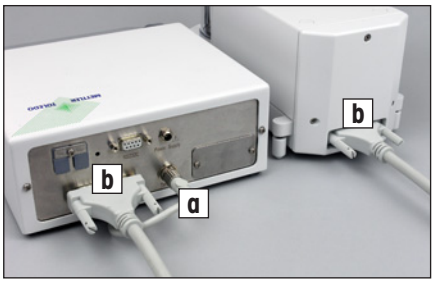
- Direct sunlight
- Draft (e.g. from fans or air conditioning)
- Excessive fluctuations in temperature.

Further information can be found in Weighing the Right Way.

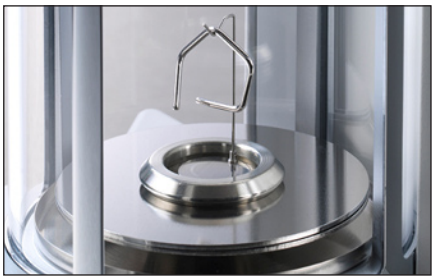


If the balance is not horizontal from the beginning, it will have to be leveled during initial operation (see section 3.2).

2.3 Assembling the balance



– Remove the parts for the draft disk from the black plastic box. Assemble the parts according to the instructions in the cover of the plastic box.
– Connect the terminal cable (a) to the control unit.
– Use the cable delivered (b) to connect the control unit to the weighing cell.



XP6U only: A hook weighing pan is also delivered with this model. Should you wish to use this, remove the standard round weighing pan and install the hook weighing pan according to the instructions in the cover of the black plastic box.

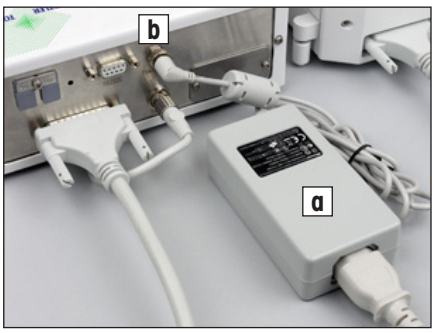
2.4 Power supply

Your balance is delivered complete with an AC adapter and a country-specific power supply cable. The AC adapter is suitable for all power supply voltages in the range of:

100 – 240 VAC, 50/60 Hz (for exact specifications, see section 5).

Check that the local power supply voltage is in this range. **If it is not, DO NOT connect the balance or the AC adapter to the power supply**, and contact your METTLER TOLEDO dealer.

Do not connect the balance to outlets that are not grounded! Do not use extension cords without PE conductors!



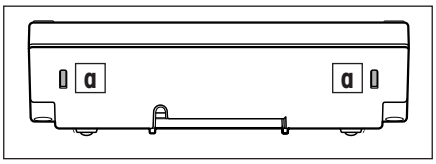
Plug the AC adapter (a) into the socket (b) in the back of your control unit and into the power supply.

Important: Guide the cables so that they cannot become damaged and will not be in your way during your daily work! Take care that the AC adapter cannot come into contact with liquids!

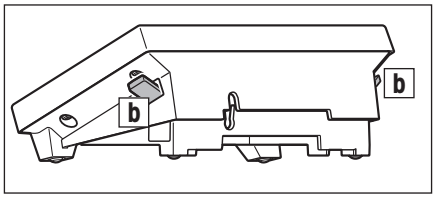
Ensure that the AC power pack for the balance is only used in accordance with the specifications listed in section 5.1.

After the balance has been connected to the power supply, it carries out a self test and is then ready for operation.

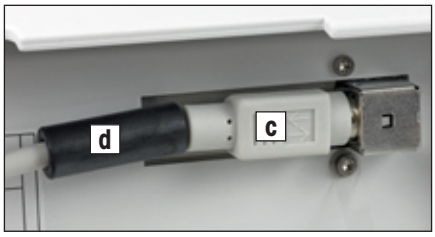
Note: If the display field remains dark, even though the power supply connection functions, first disconnect the balance from the power supply. Open the terminal:



Terminal of XP models: Press both buttons (a) on the back of the terminal and open the upper part of the terminal.

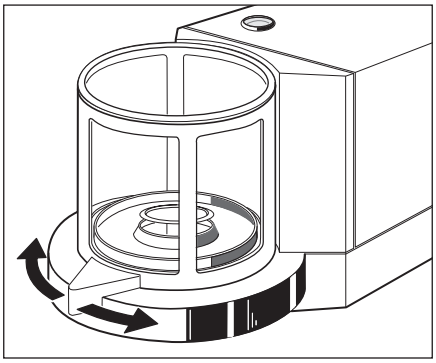


Terminal of XS models: Press both flaps (b) on the side of the terminal and open the upper part of the terminal.



Check that the plug for the terminal cable (c) is connected correctly inside the terminal. Ensure that the ferrite core (d) makes full contact on the plug.

2.5 Operating of the glass draft shield



The glass draft shield on your balance can be opened and closed by turning the door handle.

On **XP models**, the draft shield can also be operated via the "↕" button or the "SmartSens" sensors (see Operating Instructions – Part 2).

During weighing, always ensure that the draft shield is closed!

2.6 Setting the reading angle and location of the terminal

2.6.1 Setting the reading angle

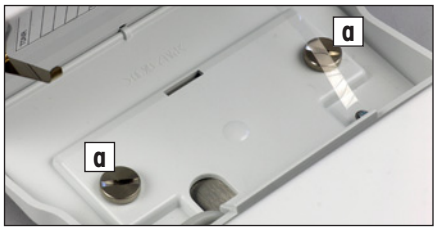
To change the reading angle, press both buttons or flaps used to open the terminal (see above). The top of the terminal can then be pulled up or pushed down until it engages in the desired position. A total of 3 setting positions are available.

2.6.2 Remove terminal and place close to the balance

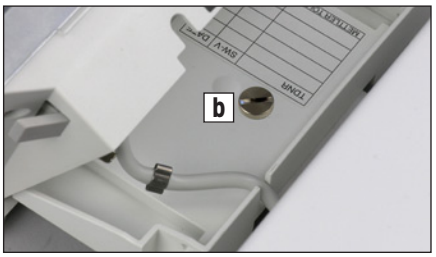
The terminal is attached to the control unit, but can be removed and positioned individually if necessary:

Switch off the balance and disconnect it from the power supply. Open the terminal by pressing both buttons or flaps (see section 2.4). Unplug the cable from the connection socket in the terminal.

Detach the terminal from the terminal support:

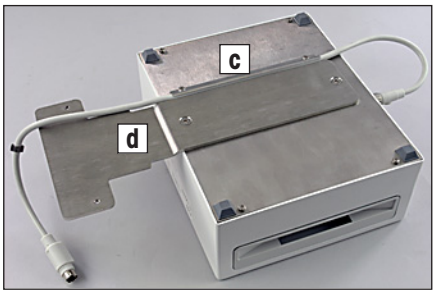


– On **XP models**, unscrew both knurled screws (a) on the inside of the terminal.



– On **XS models**, the terminal is attached with just one knurled screw (b).

Pull the terminal cable out of the terminal.



Release the cable guide (c) on the underside of the control unit (2 Torx T-10 screws). The cable is now free and you can position the terminal separately.

The terminal support (d) is attached to the underside of the control unit with 2 screws (Torx T-20). You can leave the terminal support on the control unit or remove it.

Reconnect the balance to the power supply.

2.7 Transporting the balance

2.7.1 Transporting over short distances

If you wish to move your balance **over a short distance** to a new location, proceed as follows:

Switch off the balance and unplug the cable of the AC adaptor, and any interface cables, from the control unit. It is not necessary to disconnect the control unit from the weighing cell.

Grasp the control unit and weighing cell by the sides of the housing and carry them to their new location (observe the notes in section 2.2 regarding the choice of an optimal location).

Never lift the balance by the glass draft shield, as this can cause damage!

2.7.2 Transporting over long distances

If you want to transport or ship your balance over long distances, or if it is not certain that the balance will be transported upright, use the **complete original packaging**. Package the balance according to the illustrations and information in section 2.1.1.

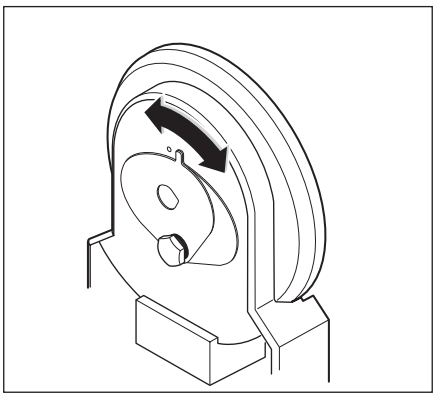
Ensure that you place the shipping lock (plastic protection) in the glass draft shield!

2.8 Below-the-balance weighing

So that weighings can be carried out below the working surface (below-the-balance weighing), your balance is provided with a special hanger.

Switch off the balance and unplug the connection cable for the control unit from the back panel of the weighing cell.

Remove the glass cover, the weighing pan, and the draft disk. Remove the draft shield from the unit.



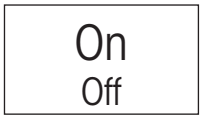
Carefully tip the weighing cell toward the back.

Turn the cover plate of the hanger for below-the-balance weighing until the hole for the feedthrough is exposed.

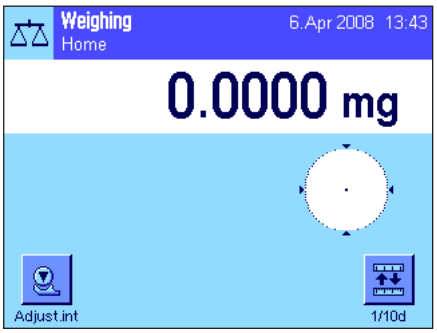
The weighing cell is now ready for installing the feedthrough for below-the balance weighing.

3 Leveling the balance

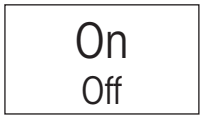
3.1 Switching the balance on and off



Switching on the balance: Press the «**On/Off**» key briefly. The balance carries out a test and is then ready to weigh.



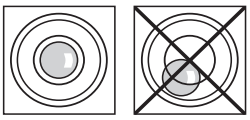
The display opposite appears when the balance is switched on **for the first time** (this example shows the color display of the XP models).



Switching off the balance: Press and hold the «**On/Off**» key until the message "OFF" appears in the display. The display then fades and the balance is switched off.

3.2 Leveling the balance

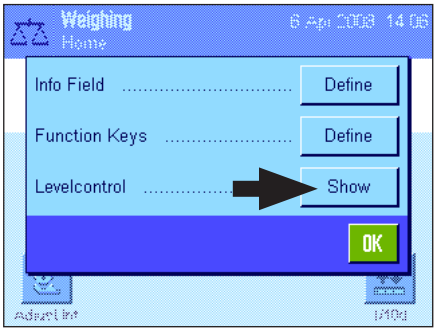
Check the position of the air bubble in the level indicator on the top of the weighing cell. If the air bubble is not in the inner circle, the weighing cell needs to be leveled.



Turn the two leveling screws on the back of the weighing cell until the air bubble is in the inner circle of the level indicator (left figure = leveled correctly, right figure = leveled incorrectly).

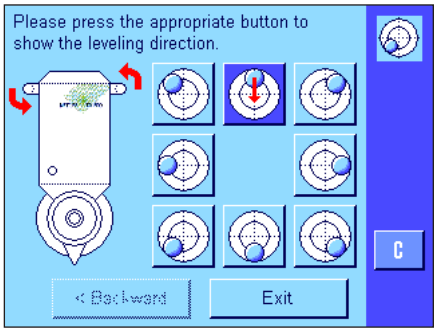
3.2.1 Leveling aid of the XP models

The XP models have a built-in leveling aid.



On the terminal, touch the large empty space below the weighing result. The following display appears.

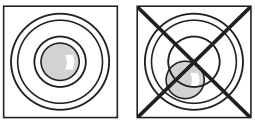
To start the leveling aid, touch the button at the bottom of the screen.



Watch the level indicator on your balance and press the button that matches the current position of the air bubble in the level indicator.

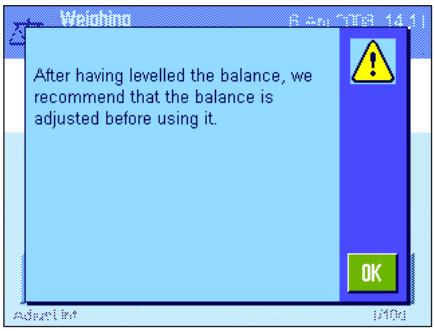
The leveling aid will show you with red arrows which direction you need to turn the two footscrews on the back of the weighing cell.

Turn the footscrew(s) in the direction indicated until the air bubble is in the inner circle of the level indicator. If you are unable to do this on your first attempt, you can press the button again that matches the current position of the air bubble at any time.



As soon as the air bubble is in the inner circle of the level indicator, the balance has been leveled correctly (left figure = leveled correctly, right figure = leveled incorrectly).

Press the "**Exit**" button to exit the leveling aid.



Before the balance returns to weighing mode, a message appears that advises you to adjust the balance after you have leveled it. Confirm the message with "**OK**".

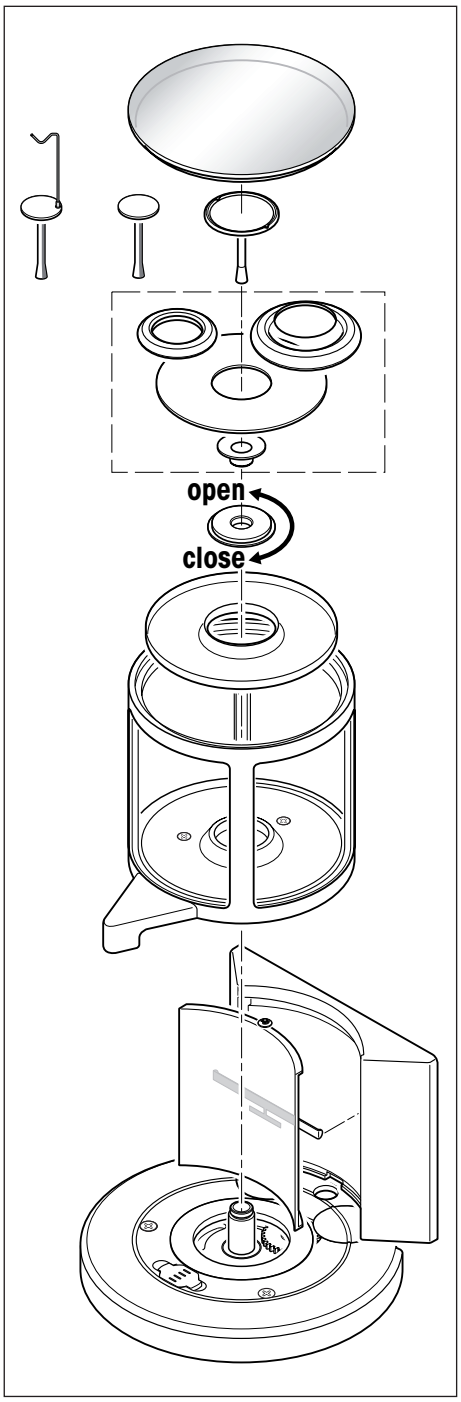
4 Cleaning and service

Periodically clean the weighing chamber, the housing, and the terminal of your balance using the brush supplied with it.

To clean the weighing chamber thoroughly, pull the draft disk (which on the XP2U and XP6U balances is made up of several parts) and the weighing pan vertically up and off (it may be necessary to turn the weighing pan slightly to remove it).

When you replace these parts, make sure they are in the correct position.

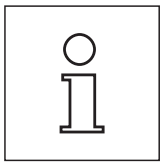
Your balance is made from high quality, resistant materials and can therefore be cleaned with a commercially available, mild cleaning agent.



Please observe the following notes:

- On no account use cleaning agents, which contain solvents or abrasive ingredients, as this can result in damage to the terminal overlay.
- Ensure that no liquid comes into contact with the balance, the terminal or the AC adapter.
- Never open the balance, terminal or AC adapter - they contain no components, which can be cleaned, repaired or replaced by the user.

Note: This also applies to the built-in clock battery in the balance.



Please contact your METTLER TOLEDO dealer for details of the available service options. Regular servicing by an authorized service engineer ensures constant accuracy for years to come and prolongs the service life of your balance.

5 Technical data

In this section you will find the most important technical data for your balance.

5.1 General data

Power supply

- Power supply connector with AC/DC adapter: 11107909
  Primary: 100-240 VAC, -15%/+10%, 50/60 Hz
  Secondary: 12 VDC ±/-3%, 2.0 A (with electronic overload protection)
- Cable to AC adapter: 3-core, with country-specific plug
- Power supply to the balance: 12 VDC ±/-3%, 2.0 A, maximum ripple: 80 mVDCpp

Use only with a tested AC adapter with SELV output current.
Ensure correct polarity

Protection and standards

- Overvoltage category: Class II
- Degree of pollution: 2
- Standards for safety and EMC: See Declaration of Conformity
- Range of application: For use only in closed interior rooms

Environmental conditions

- Height above mean sea level: Up to 4000 m
- Ambient temperature: 5-40 °C
- Relative air humidity: Max. 80% at 31 °C, linearly decreasing to 50% at 40 °C, noncondensing
- Warm-up time: 24 hours after connecting the balance to the power supply; when switched on from standby-mode, the balance is ready for operation immediately.

Materials

- Housing: Die-cast aluminum, plastic, chrome steel and glass
- Terminal: Die-cast zinc, chromed and plastics
- Weighing pan: Aluminum, chromed (AlMgSi1 coated chem Ni 15 µm, Cr 0.3 – 0.5 µm)

5.1.1 Explanatory notes for the METTLER TOLEDO AC adapter

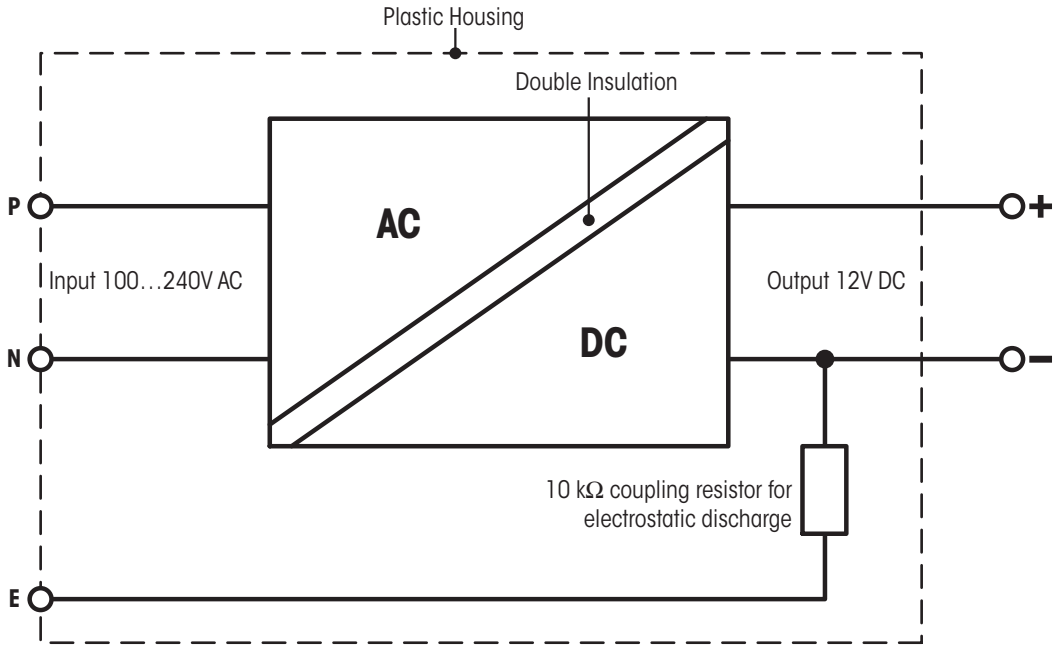
The certified external power supply which conforms to the requirements for Class II double insulated equipment is not provided with a protective earth connection but with a functional earth connection for EMC puposes. This earth connection IS NOT a safety feature. Further information about conformance of our products can be found in the brochure "Declaration of Conformity" which is coming with each product or can be downloaded from www.mt.com.

In case of testing with regard to the directive 2001/95/CE the power supply and the balance have to be handled as Class II double insulated equipment.

Consequently an earth bonding test is not required. Similarly it is not necessary to carry out an earth bonding test between the supply earth conductor and any exposed metalwork on the balance.

Because the balances are sensitive to static charges a leakage resistor, typically 10 kΩ, is connected between the earth connector and the power supply output terminals. The arrangement is shown in the figure below. This resistor is not part of the electrical safety arrangement and does not require testing at regular intervals.

Equivalent circuit diagram:



5.2 Model-specific data

Parameter Limit values		XP2U	XP6U	XP6	XS3DU
Maximum capacity		2.1 g	6.1 g	6.1 g	3.1 g
Maximum capacity, fine range		—	—	—	0.8 g
Readability		0.0001 mg	0.0001 mg	0.001 mg	0.01 mg
Readability, fine range		—	—	—	0.001 mg
Repeatability (at nominal load)	sd	0.00025 mg (2 g)	0.0004 mg (5 g)	0.0008 mg (5 g)	0.006 mg (3 g)
Repeatability (at low load) [1]	sd	0.0002 mg (0.2 g)	0.00025 mg (0.2 g)	0.0006 mg (0.2 g)	0.005 mg (0.2 g)
Repeatability, fine range (at nominal load) [1]	sd	—	—	—	0.001 mg (0.8 g)
Repeatability, fine range (at low load)	sd	—	—	—	0.0008 mg (0.2 g)
Linearity deviation		0.0015 mg	0.004 mg	0.004 mg	0.01 mg
Eccentricity deviation (test load) [2]		0.0025 mg (1 g)	0.002 mg (2 g)	0.003 mg (2 g)	0.004 mg (1 g)
Sensitivity offset (test load) [3]		0.03 mg (2 g)	0.048 mg (6 g)	0.048 mg (6 g)	0.045 mg (3 g)
Sensitivity temperature drift [4]		0.0001%/°C	0.0001%/°C	0.0001%/°C	0.0001%/°C
Sensitivity stability [5]		0.0001%/a	0.0001%/a	0.0001%/a	0.0001%/a
Dimensions and other data					
Balance dimensions (WxDxH) [mm]		128 x 287 x 113	128 x 287 x 113	128 x 287 x 113	128 x 287 x 113
Diameter of weighing pan		16 mm	16 mm	27 mm	27 mm
Usable height of draft shield		55 mm	55 mm	55 mm	55 mm
Weight of balance		7.5 kg	7.5 kg	7.5 kg	7 kg
Taring range		0…2.1 g	0…6.1 g	0…6.1 g	0…3.1 g
Settling time		10 s	15 s	7 s	6 s
Settling time, fine range		—	—	—	10 s
Interface update rate		23 /s	23 /s	23 /s	23 /s
Internal adjustment weights		2	2	2	2
Typical uncertainties					
Repeatability [1]	sd	$0.00015mg+0.0000025\%\cdot R_{gr}$	$0.00015mg+0.0000025\%\cdot R_{gr}$	$0.0004mg+0.000003\%\cdot R_{gr}$	$0.003mg+0.00006\%\cdot R_{gr}$
Repeatability, fine range [1]	sd	—	—	—	$0.0005mg+0.000012\%\cdot R_{gr}$
Differential linearity deviation	sd	$\sqrt{(8x10^{-11}mg\cdot R_{nt})}$	$\sqrt{(1.5x10^{-10}mg\cdot R_{nt})}$	$\sqrt{(1.5x10^{-10}mg\cdot R_{nt})}$	$\sqrt{(1.2x10^{-9}mg\cdot R_{nt})}$
Differential eccentric load deviation	sd	$0.00008\%\cdot R_{nt}$	$0.00003\%\cdot R_{nt}$	$0.00005\%\cdot R_{nt}$	$0.00012\%\cdot R_{nt}$
Sensitivity offset [3]	sd	$0.0003\%\cdot R_{nt}$	0.00015%·Rnt	0.00015%·Rnt	0.0003%·Rnt
Minimum weight (according to USP) [1] [6]		$0.45mg+0.0075\%\cdot R_{gr}$	$0.45mg+0.0075\%\cdot R_{gr}$	$1.2mg+0.009\%\cdot R_{gr}$	$9mg+0.18\%\cdot R_{gr}$
Minimum weight (according to USP), fine range [1] [6]		—	—	—	$1.5mg+0.036\%\cdot R_{gr}$
Minimum weight (@ U=1%, 2 sd) [1] [6]		$0.03mg+0.0005\%\cdot R_{gr}$	$0.03mg+0.0005\%\cdot R_{gr}$	$0.08mg+0.0006\%\cdot R_{gr}$	—
Minimum weight (@ U=1%, 2 sd), fine range [1] [6]		—	—	—	$0.1mg+0.0024\%\cdot R_{gr}$

1) Valid for compact objects
2) According to OIML R76
3) After adjustment with built-in reference weight
4) In the temperature range 10...30 °C
5) After putting into operation for the first time, with the self-adjustment function activated (ProFACT or FACT)
6) The minimum weight can be improved by the following measures:
   – Selecting suitable weighing parameters
   – Choosing a better location
   – Using smaller taring containers

sd = Standard deviation
R_{gr} = Gross weight
R_{nt} = Net weight (sample weight)
a = Year (annum)

Data shown as typical are reference values for calculation of the expected measurement uncertainty.The actual measurement performance may be affected negatively or positively by the place of use and/or the settings.

5.2.1 Procedure for certified balances

Preface

Certified balances are subject to the national, legal requirements of "non-automatic balances".

Switching on the balance

- **Switching on**
  - Immediately after being switched on, the balance displays 0.000.. g on.
  - The balance is always started up with the "Factory setting" unit.
- **Switch-on range**
  - A maximum 20 % of the type load, otherwise overload is displayed (OIML R76 4.5.1).
- **Stored value as switch-on zero point**
  - It is not permissible to use a stored value as a switch-on zero point; the MT-SICS M35 command is not available (OIML R76 T.5.2).

Display

- **Display of the weight value**
  - The "e" certification value is always shown in the display and is specified at the model designation plate (OIML R76 T.3.2.3 and 7.1.4).
  - If the display increment is lower than the "e" certification value, this is variably displayed for the net, gross and weighed tare. (Graying of the digits or certification brackets) (OIML R76 T.2.5.4 and 3.4.1).
  - In accordance with guidelines, the tested display increment (certification value) is never lower than 1 mg (OIML R76 T.3.4.2).
  - At balances with d = 0.1 mg, the digits below 1 mg are displayed in gray. These digits in brackets are printed. In accordance with legal metrology requirements, this illustration does not affect the accuracy of the weighing results.

- **Units of measurement**
  - The display and info unit are firmly set to g or mg (depending on the model).
  - The following applies for the "Custom unit":
    - no certification brackets.
    - The following names are blocked, this applies to upper and lower case letters.
      - all official units (g, kg, ct etc.).
      - c, ca, car, cm, crt, cart, kt, gr, gra, gram, grm, k, kilo, to, ton.
      - all names with "o" which can be replaced by a zero (0z, 0zt etc.).

- **Identification of the weight display**
  - Gross, net, tare and other weight values are accordingly marked (OIML R76 4.6.5).
    - Net for net when a tare value has been used.
    - B or G for gross.
    - T for the weighed tare.
    - PT for the specified tare.
    - * or diff for the difference between the net or gross.

- **Info field**
  - The info weight value is handled metrologically in the same way as the weight value in the main display.

Printout (OIML R76 4.6.11)

- If a tare value is entered manually (PreTare), the PreTare value is always printed along with the net value (PT 123.45 g).
- The printed weight values are identified in the same way as the weight value on the display.
  I.e. N, B or G, T, PT, diff or *, with differentiation.

  Example:
  Single-range balance.
  N 123.4[5] g
  PT 10.00 g ➔ for PreTare
  G 133.4[5] g

  DR balance with 100.00 g fine range.
  N 80.4[0] g
  T 22.5[6] g ➔ for weighed tare
  G 102.9[ ] g

Balance functions

- **Reset to zero**
  - The zero range is limited to a maximum of ± 2 % of the full load (OIML R76 4.5.1).

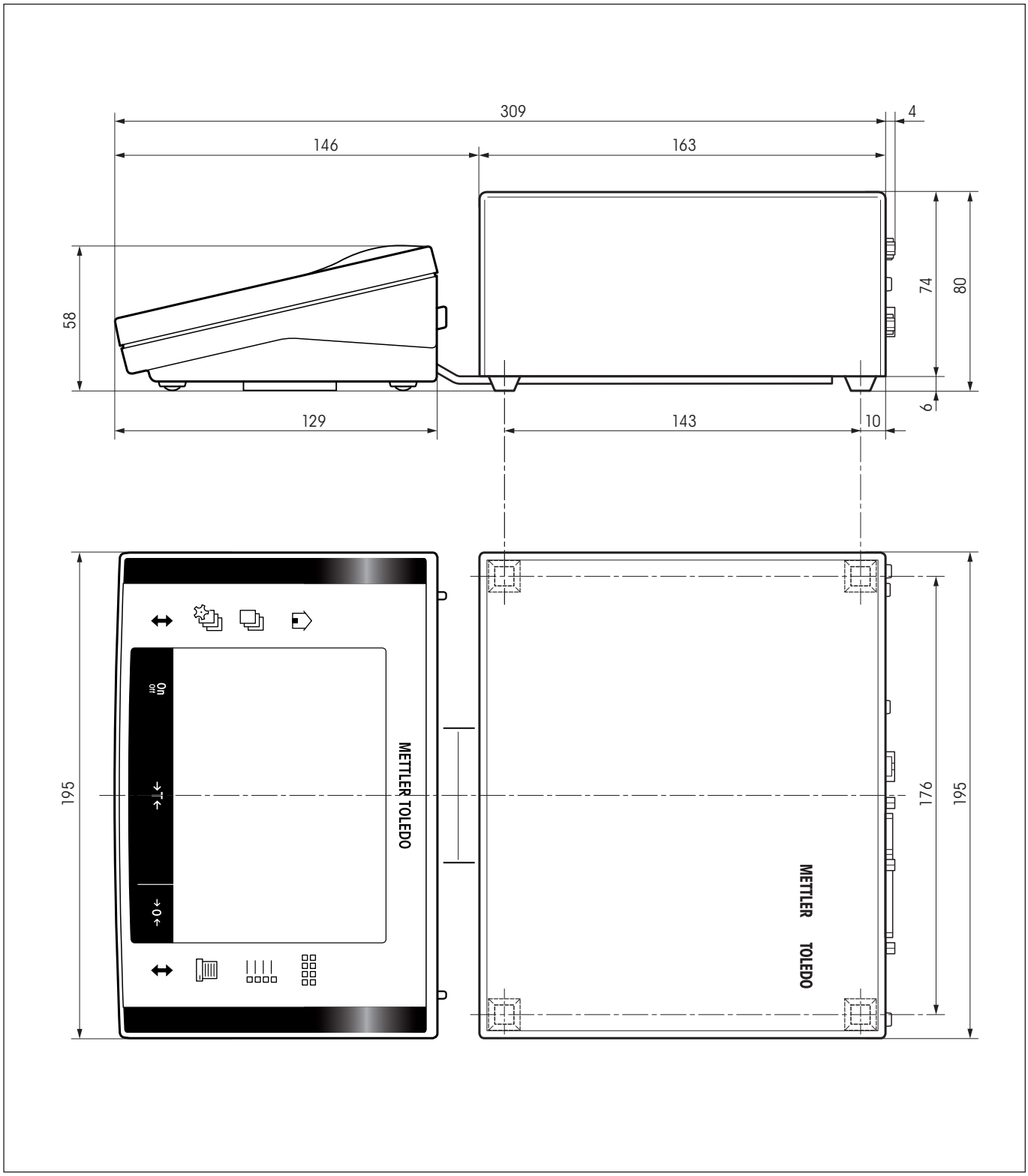
- **Tare**
  - No negative tare values are permitted.
  - Tare immediate (TI) is not permitted, the MT-SICS TI command is not available (OIML R76 4.6.4).

- **1/xd**
  - **e = d**
    The 1/xd switchover is not permitted (OIML R76 3.1.2).
  - **e = 10d**
    This is only permitted in the case of the 1/10d switchover.
  - **e = 100d**
    Only the 1/10d and 1/100d switchover are permitted.

5.3 Dimensions

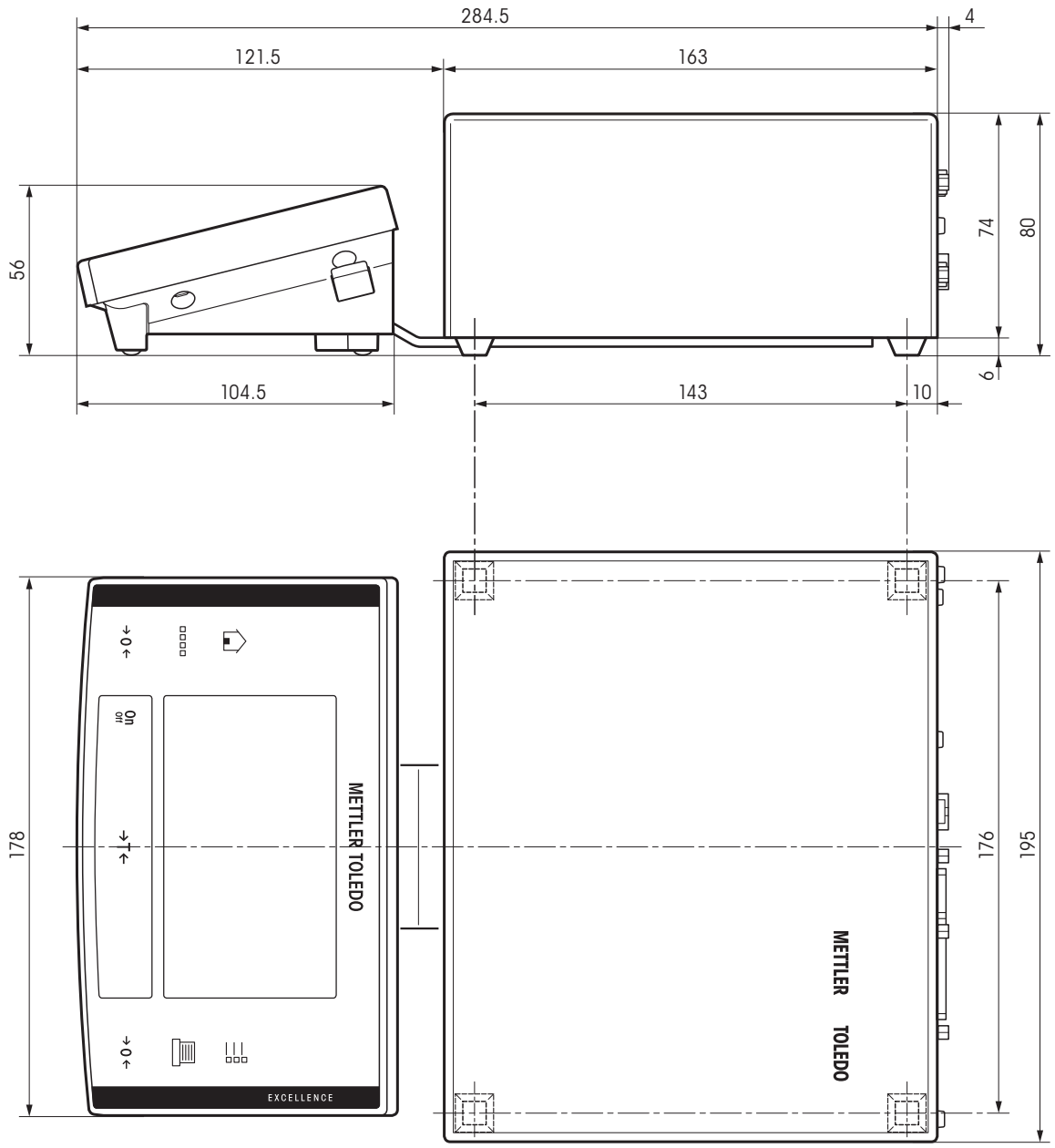
5.3.1 Dimensions of the terminal and control unit of XP models

Dimensions in millimeters.



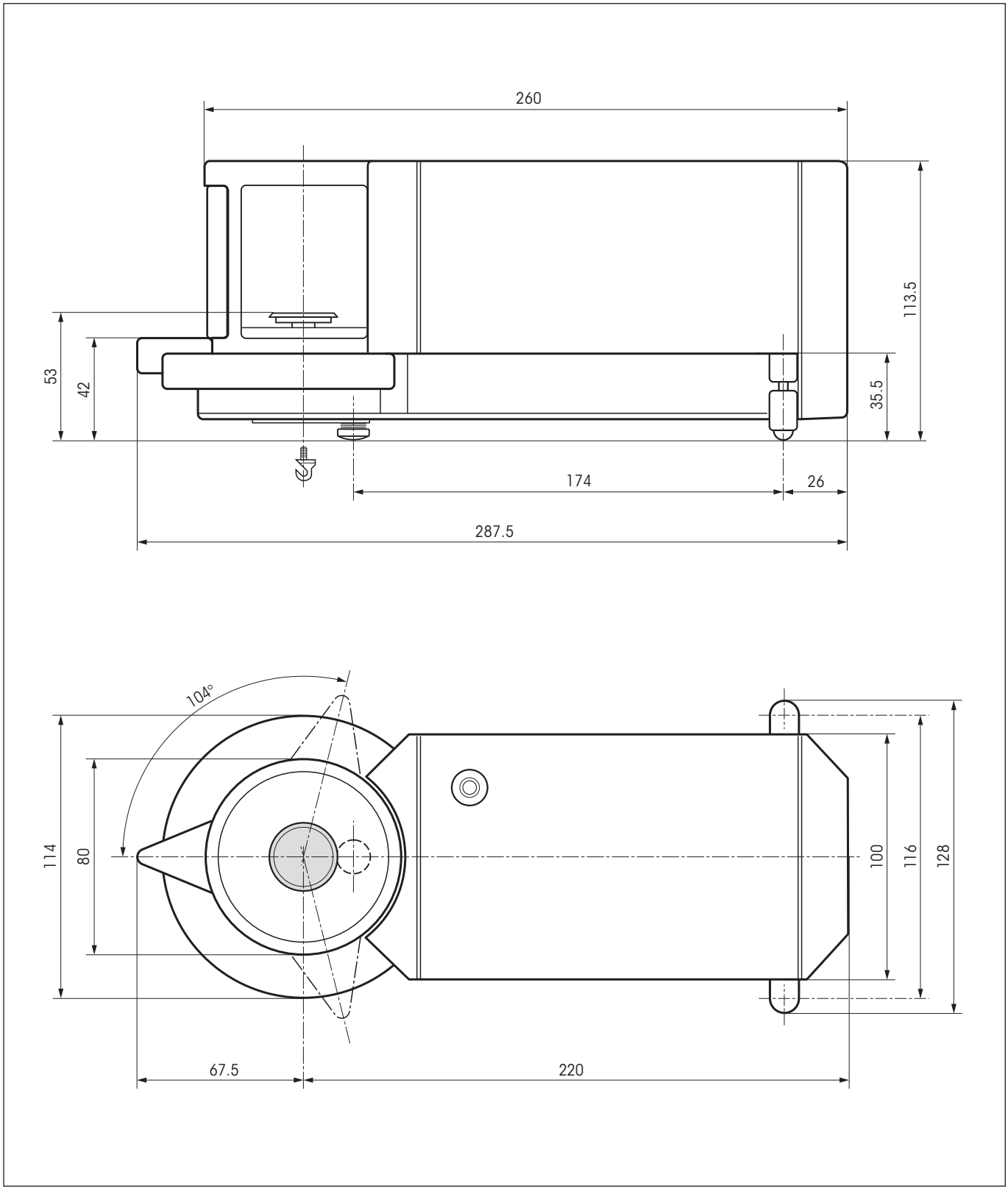
5.3.2 Dimensions of the terminal and control unit of XS models

Dimensions in millimeters.

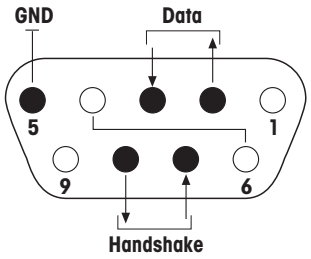


5.3.3 Dimensions of the weighing cell (XS and XP models)

Dimensions in millimeters.



5.4 Specifications of the RS232C interface

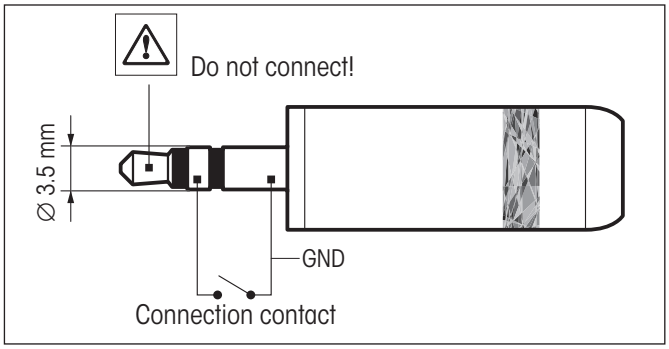
Interface type:	Voltage interface according to EIA RS-232C/DIN 66020 (CCITT V24/V.28)
Max. cable length:	15 m
Signal level:	Outputs: +5 V ... +15 V (RL = 3 – 7 kΩ) –5 V ... –15 V (RL = 3 – 7 kΩ) Inputs: +3 V ... 25 V –3 V ... 25 V
Connector:	Sub-D, 9-pole, female
Operating mode:	Full duplex
Transmission mode:	Bit-serial, asynchronous
Transmission code:	ASCII
Baud rates:	600, 1200, 2400, 4800, 9600, 19200, 38400 [1] (firmware selectable)
Bits/parity:	7-bit/even, 7-bit/odd, 7-bit/none, 8-bit/none (firmware selectable)
Stop bits:	1 stop bit
Handshake:	None, XON/XOFF, RTS/CTS (firmware selectable)
End-of-line:	<CR><LF>, <CR>, <LF> (firmware selectable)
	Pin 2: Balance transmit line (TxD) Pin 3: Balance receive line (RxD)) Pin 5: Ground signal (GND) Pin 7: Clear to send (hardware handshake) (CTS) Pin 8: Request to send (hardware handshake) (RTS)

[1] 38400 baud is only possible in special cases, such as:

- Weighing platform without terminal, or
- Weighing platform with terminal, only via the optional RS232C interface.

5.5 Specifications of the "Aux" connections

You can connect the METTLER TOLEDO "**ErgoSens**" or an external switch to sockets "Aux 1" and "Aux 2". This allows you to start functions such as taring, zeroing, printing and others.



External connection:

Connector:	3.5 mm stereo jack connector	
Electrical data:	Max. voltage	12 V
	Max. current	150 mA

5.6 MT-SICS Interface commands and functions

Many of the balances and scales used have to be capable of integration in a complex computer or data acquisition system.
To enable you to integrate balances in your system in a simple manner and utilize their capabilities to the full, most balance functions are also available as appropriate commands via the data interface.
All new METTLER TOLEDO balances launched on the market support the standardized command set "METTLER TOLEDO Standard Interface Command Set" (MT-SICS). The commands available depend on the functionality of the balance.

Basic information on data interchange with the balance

The balance receives commands from the system and acknowledges the command with an appropriate response.

Command formats

Commands sent to the balance comprise one or more characters of the ASCII character set. Here, the following must be noted:

- Enter commands only in uppercase.
- The possible parameters of the command must be separated from one another and from the command name by a space (ASCII 32 dec., in this description represented as ␣).
- The possible input for "text" is a sequence of characters of the 8-bit ASCII character set from 32 dec to 255 dec.
  Note: For language-specific characters, please see Operating Instructions – Part 2, section 3.7.
- Each command must be closed by C_RL_F (ASCII 13 dec., 10 dec.).

The characters C_RL_F, which can be inputted using the Enter or Return key of most entry keypads, are not listed in this description, but it is essential they be included for communication with the balance.

Example

S – Send stable weight value

Command	`S`	Send the current stable net weight value.
Response	`S␣S␣WeightValue␣Unit`	
		Current stable weight value in unit actually set under unit 1.
	`S␣I`	Command not executable (balance is currently executing another command, e.g. taring, or timeout as stability was not reached).
	`S␣+`	Balance in overload range.
	`S␣-`	Balance in underload range.

Example

Command	`S`	Send a stable weight value.
Response	`S␣S␣␣␣␣␣␣100.00␣g`	
		The current, stable weight value is 100.00 g

The MT-SICS commands listed below are the commands used most often. For additional commands and further information please refer to the Reference Manual MT-SICS downloadable from the Internet under mt.com.

S – Send stable weight value

Command	**S**	Send the current stable net weight value.

SI – Send value immediately

Command	**SI**	Send the current net weight value, irrespective of balance stability.

SIR – Send weight value immediately and repeat

Command	**SIR**	Send the net weight values repeatedly, irrespective of balance stability.

Z – Zero

Command	**Z**	Zero the balance.

@ – Reset

Command	@	Resets the balance to the condition found after switching on, but without a zero setting being performed.

SR – Send weight value on weight change (Send and Repeat)

Command	**SR**	Send the current stable weight value and then send continuously the stable weight value after every weight change. The weight change must be at least 12.5 % of the last stable weight value, minimum = 30 d.

ST – Send stable weight after pressing «🖶» key

Command	**ST␣1**	Send the current stable net weight value each time when «🖶» is pressed.
Response	**ST␣0**	Stop sending weight value when «🖶» is pressed. • **ST** function is not active: – after switching on the balance. – after the "Reset" command.

SU – Send stable weight value with currently displayed unit

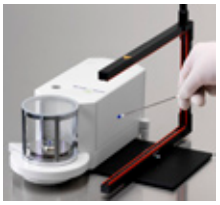
Command	**SU**	As the "**S**" command, but with the currently displayed unit.

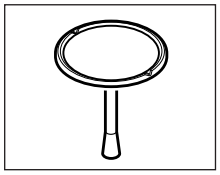
6 Accessories and spare parts

6.1 Accessories

You can increase the functionality of your balance with accessories from the METTLER TOLEDO range. The following options are available:

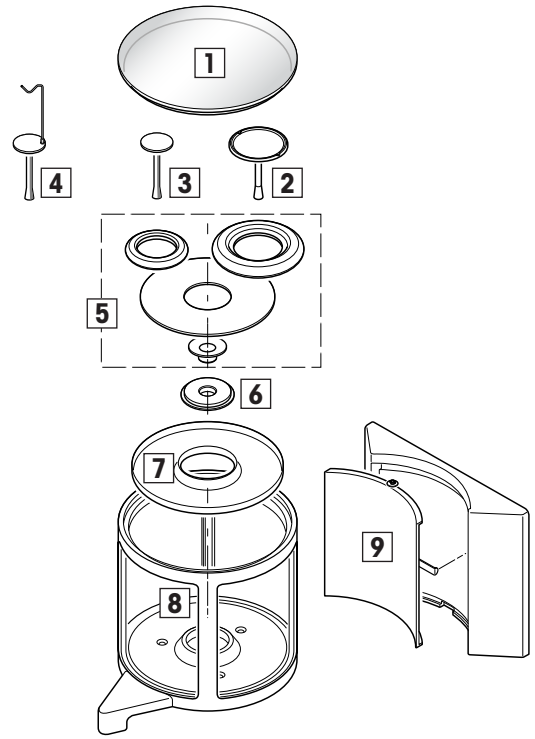
	Designation	No.
	Printers	
	RS-P25 compact printer RS232C (for Japanese, Chinese and Russian language)	12122627
	RS-P42 Printer with RS232C connection to the balance	00229265
	Optional interfaces	
	BT option: Interface Bluetooth, multipoint connection for up to 6 Bluetooth devices	11132530
	BTS option: Interface Bluetooth, single-point connection	11132535
	Ethernet option: Interface Ethernet for connection to Ethernet network	11132515
	PS/2 option: Interface for connecting commercial keyboards and barcode readers	11132520
	RS232C option: Interface for connection of a printer (RS232C), computer or titrator	11132500
	LocalCAN option: Interface for connection of up to 5 LC (LocalCAN) instruments	11132505
	MiniMettler option: Interface MiniMettler, for connection to older (legacy) METTLER TOLEDO systems	11132510
	USB – RS232 converter cable	11103691
	e-Link IP65 EBO1: Ethernet connection to the e-link network with IP65 protection	11120003
	Cables for RS232C interface	
	RS9 – RS9 (m/f): Connection cable for PC or printer RS232C, length = 1 m	11101051
	RS9 – RS25 (m/f): Connection cable for PC (IBM XT or compatible), length = 2 m	11101052
	RS9 – RS9 (m/m): Connection cable for devices with DB9 socket (f), length = 1 m	21250066
	Cables for LocalCAN interface	
	LC – RS9: Cable for connecting a PC with RS232C, 9-pin (f), lenght = 2 m	00229065
	LC – RS25: Cable for connecting a printer or PC with RS232C, 25-pin (m/f), lenght = 2 m	00229050
	LC – RS open: Cable for connecting to a MT ComBus system, length = 4 m	21900640
	LC – CL: Cable for connecting a device with METTLER TOLEDO CL interface (5-pin), length = 2 m	00229130
	LC – LC03: Extension cable for LocalCAN, length = 0.3 m	00239270
	LC – LC2: Extension cable for LocalCAN, length = 2 m	00229115
	LC – LC5: Extension cable for LocalCAN, length = 5 m	00229116
	LC – LCT: Cable branch (T-connector) for LocalCAN	00229118
	Cables for MiniMettler interface	
	MM – RS9f: RS232C connection cable to MiniMettler interface, length = 1.5 m	00229029

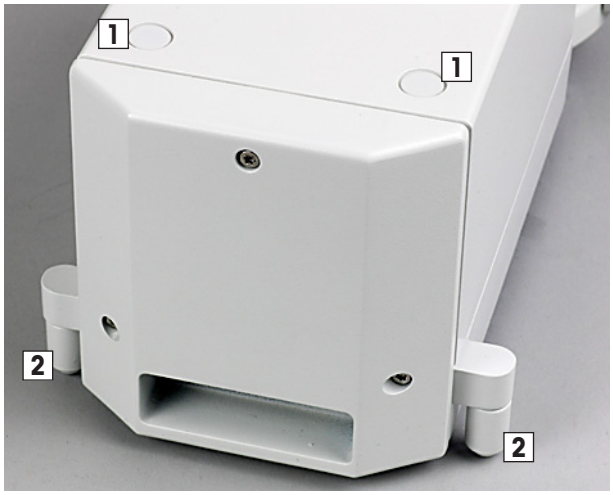
	Designation	No.
	Terminal cable Terminal extension cable, length = 4.5 m	11600517
	Auxiliary display RS/LC-BLD Auxiliary display for table mounting, 168 mm, LCD display with backlighting	00224200
	Sensors ErgoSens, optical sensor for remote operation (for XP models only)	11132601
	LC-I/O Relay interface Relay interface for controlling up to 8 external devices from the balance	21202217
	LC-switchbox Connect up to 3 balances with LocalCAN interface to a printer	00229220
	Footswitches Auxiliary footswitch with selectable function for balances (Aux 1, Aux 2)	11106741
	LC-FS foot switch with selectable function for balances with LocalCAN interface	00229060
	**Universal anti-static kit** Universal anti-static kit complete (U-shaped), including electrode and power supply	11107767
	Optional: Second U-electrode* for universal anti-static kit	11107764
	Optional: Point-electrode* for universal anti-static kit (for discharging small samples)	11107765
	* Power supply for optional, second U-elektrode (11107764)	11107766
	Filter kit Filter kit for XP/XS/MX/UMX balances ø 110 mm	00211227
	Filter kit for XP/XS/MX/UMX balances ø 47 mm and ø 70 mm	11122136

	Designation		No.
	Funnel kit Funnel kit for XP/XS/UMX/MX balances		00211220
	Wall fixture for terminal		11132665
	Protective housing IP54 IP54 protective housing for AC adapter		11132550
	**Weighing pan** Weighing pan ø 15.7 mm, chrome-nickel steel X5CrNi 18-10		11100437
	Barcode readers		
	RS232C barcode reader (without power supply and cables)		21901297
	RS232C barcode reader – cordless (without power supply and cables)		21901299
	The following items needs for operation:	Power supply 5 V (for 21901297)	21901311
		Power supply 12 V (for 21901299)	21901312
		RS232 F cable	21901305
		Null modem adapter	21900924
	plus 1 of the following:	Power cable EU*	21901313
		Power cable UK*	21901314
		Power cable US*	21901315
	* according to region of use	Power cable AUS*	21901316
	Bluetooth barcode reader		21901298
	One of the following needs for operation:	Power cable EU*	21901313
		Power cable UK*	21901314
		Power cable US*	21901315
	* according to region of use	Power cable AUS*	21901316
	PS/2 barcode reader		21901297
	The following item needs for operation:	PS/2 wedge single cable	21901307
	PS/2Y barcode reader		21901297
	The following item needs for operation:	PS/2 wedge twin (Y) cable	21901308
	Protective covers Protective cover for XS terminal		11106870
	Protective cover for XP terminal		11132570

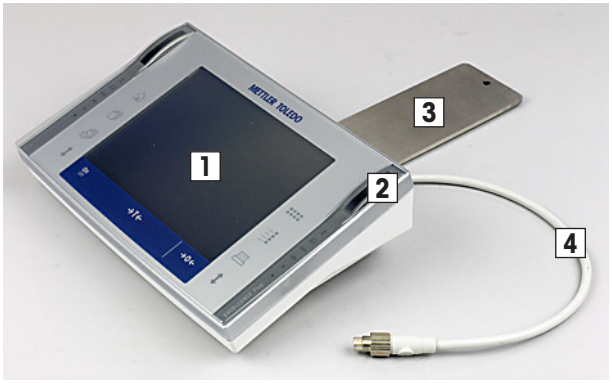
	Designation	No.
	Software **LabX Software for One Click™ Weighing Solutions** Enables you to perform One Click™ Standard Preparation, One Click™ Loss on Drying, One Click™ Sieve Analysis and many other applications. Simply start the method with the One Click™ shortcut on the balance touchscreen. LabX guides you step-by-step through the SOP on the balance, performs your calculations automatically, and takes care of saving all your data. The complete solution can be tailored to match your process requirements. Visit www.mt.com/one-click-weighing for more information	11153120
	Freeweigh.Net	21900895
	Weighing tables Weighing table MX/UMX	11138044

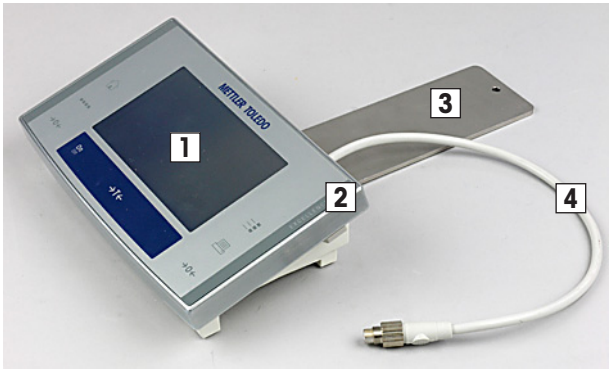
6.2 Spare parts

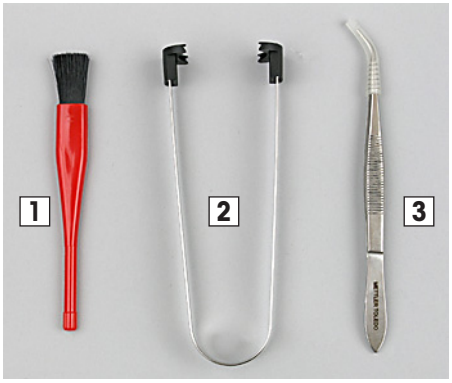
Weighing chamber	Item	Designation	No.
	1	Glass cover for draft shield:	
		Glass cover for XP6 and XS3DU	00211082
		Glass cover for XP2U and XP6U	00211177
		Weighing pan:	
	2	Weighing pan for XP6 and XS3DU	00211055
	3	Weighing pan for XP2U and XP6U	00211197
	4	Hook weighing pan for XP2U and XP6U	00211295
	5	Draft disk complete	11100075
	6	Ring nut	11100341
	7	Weighing chamber plate	00211155
	8	Weighing chamber complete:	
		Weighing chamber for XP6 and XS3DU	11100861
		Weighing chamber for XP2U and XP6U	11100862
	9	Sealing cover	00211122

Weighing cell	Item	Designation	No.
	1	Cover	11122623
	2	Footscrew	11122612

Control unit	**Item**	**Designation**	**No.**
	1	Drawer	00211163
	2	AC adapter (without power cord)	11107909
	3	Power cord:	
		DK	00087452
		GB	00089405
		USA	00088668
		AUS	00088751
		SA	00089728
		EU (Schuko)	00087925
		CH	00087920
		IT	00087457

Terminal Type "P" (color, for XP balances)	**Item**	**Designation**	**No.**
	1	Terminal Type "P"	11130692
	2	Protective cover for Terminal Type "P"	11132570
	3	Terminal support for Terminal Type "P"	11122950
	4	Terminal cable	11122830

Terminal Type "S" (monochrome, for XS balances)	**Item**	**Designation**	**No.**
	1	Terminal Type "S"	11107899
	2	Protective cover for Terminal Type "S"	11106870
	3	Terminal support for Terminal Type "S"	11122951
	4	Terminal cable	11106952

Small parts	Item	Designation	No.
	1	Cleaning brush	00071650
	2	Cleaning tweezers	00211124
	3	Weighing tweezers	00070661

Transport	Item	Designation	No.
	1	Packaging complete	11122953
	2	Export box	11122751

7 Index

A
"Aux" connections 24
AC adapter 6, 9, 16, 17
Accessories 6, 27
Assembling the balance 9

B
Below-the-balance weighing 12

C
Certified balances 19
Cleaning 15
Cleaning agents 15
Control unit 9, 32
Conventions 5

D
Dimensions 21
Display field remains dark 10
Disposal 6

E
Environmental conditions 16
ErgoSens 24

F
Features 5

G
Glass draft shield 10
GLP 5
Good Laboratory Practice 5

H
Hook weighing pan 9

I
ISO 9001 5

L
Level indicator 14
Leveling aid 13
Leveling the balance 13
Location of the terminal 10

M
Materials 16
Model-specific data 18
MT-SICS 25

O
Optional interfaces 27

P
Peripheral devices 6
Power supply 9, 16
Power supply voltage 6, 9
Protection and standards 16
Protection of the instrument 6

R
Remove terminal 11
RS232C interface 24

S
Safety 6
Selecting a location 8
Self test 9
Service 15
Setting the reading angle 10
Setting up 7
Shipping lock 8, 12
SOP 5
Spare parts 31
Standard Operating Procedure 5
Standard scope of delivery 8
Switching off the balance 13
Switching on the balance 13
Symbols 5

T
Technical data 16
Terminal 32
Transport 33
Transporting over long distances 12
Transporting over short distances 11
Transporting the balance 11

U
Unpacking the balance 7

W
Weighing cell 9, 31
Weighing chamber 31

To protect your METTLER TOLEDO product's future:

METTLER TOLEDO Service assures the quality, measuring accuracy and preservation of value of all METTLER TOLEDO products for years to come.

Please send for full details about our attractive terms of service.
Thank you.

www.mt.com/excellence

For more information

Mettler-Toledo AG
Laboratory & Weighing Technologies
CH-8606 Greifensee, Switzerland

Subject to technical changes
© Mettler-Toledo AG 2010
11781193B 1003/2.12

GWP®
Good Weighing Practice™

The global weighing guideline GWP® reduces risks associated with your weighing processes and helps to

- choose the appropriate balance
- reduce costs by optimizing testing procedures
- comply with the most common regulatory requirements

www.mt.com/GWP